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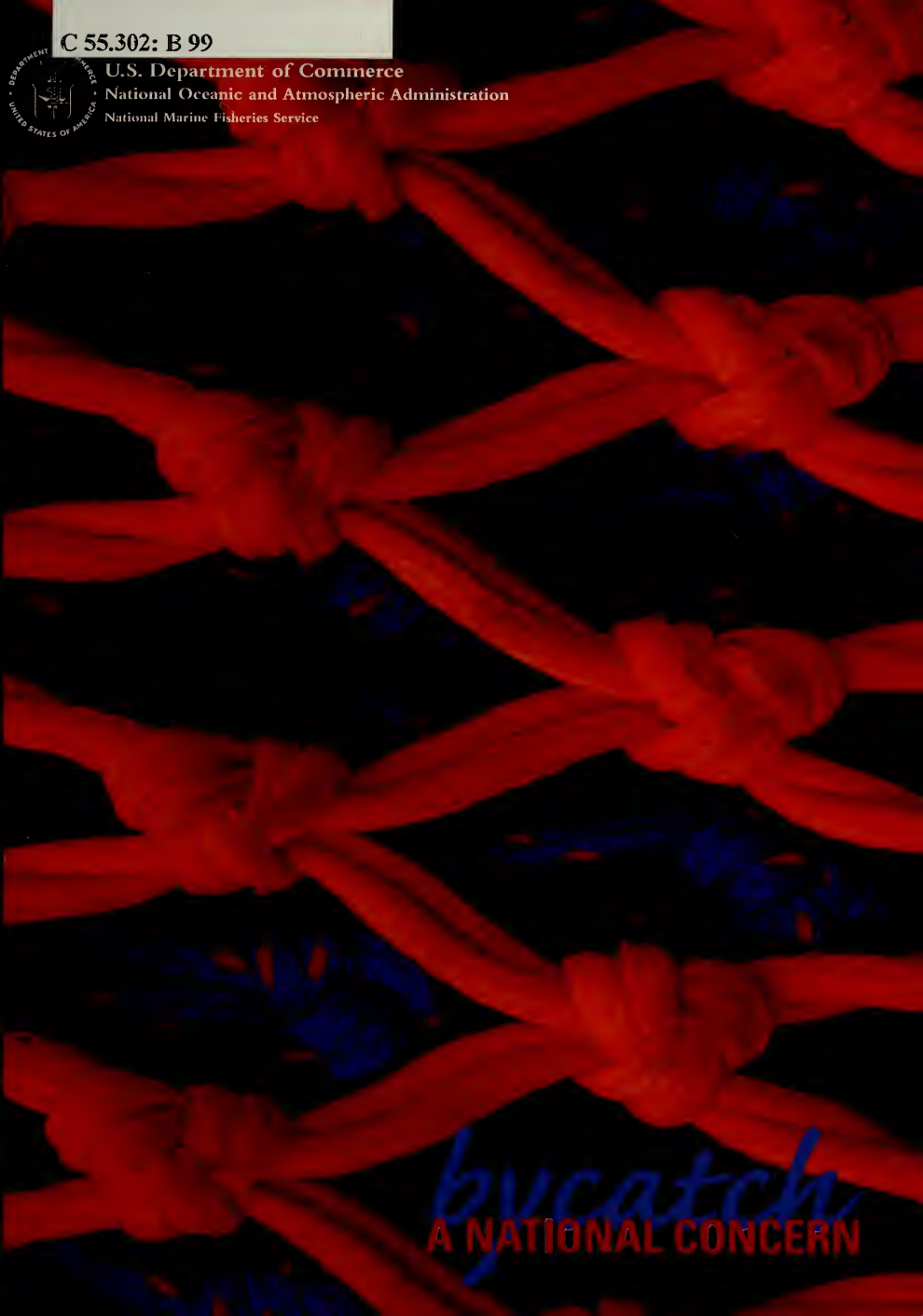
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service



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MESSAGE FROM THE DIRECTOR

Each day's news seems to bring yet another story about fisheries bycatch. When I assumed this agency's top post in 1993, I vowed to work in partnership with the states and the U.S. fishing industry to reduce bycatch. We are now beginning to see progress in this area, for both fisheries stocks and protected species. I firmly believe that government alone cannot resolve this issue: if industry is part of the bycatch problem, then industry must willingly be part of the solution.

An important part of my pledge to industry was to inform fishermen and the public about our progress in bycatch control. This brochure, which describes the current state of bycatch, is only the first of several reports intended to communicate accurate and timely information on the topic. The next such document will be the National Marine Fisheries Service strategic bycatch plan, and there will be many other research and progress reports as we move steadily toward our goal: healthy, sustainable stocks of all living marine resources in our nation's waters.

Rolland A. Schmitten, Director
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

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bycatch . . .

the word conjures an image of immense carnage and great waste of valuable fisheries resources. Graphic news photos show nets and traps twisted around the corpses of dolphins, seals, and sea birds, with abandoned gear migrating across the sea floor to decimate generations of crabs and fish. In truth, bycatch sometimes contributes to overfishing, and many tons of fish are discarded in U.S. fisheries. But portrayals of bycatch are often misleading. The intent of this brochure from the Department of Commerce's National Marine Fisheries Service (NMFS) is to improve understanding of these issues.

What is meant by "bycatch"?

The public currently hears a great deal about bycatch, although it is not a new issue—the Bible mentions throwing away unwanted fish as the catch is sorted from fishermen's nets. But bycatch today is a concern of international proportions affecting every major fishing nation. This concern has led to strong measures by NOAA's National Marine Fisheries Service, the U.S. Congress, and the United Nations to reduce fisheries bycatch.

There is no universally accepted definition of the term "bycatch." Very broadly, of course, it is regarded as unintended fisheries catch. The newly reauthorized Magnuson-Stevens Fishery Conservation and Management Act defines bycatch as "fish which are harvested in a fishery but which are not sold or kept for personal use, and includes economic discards and regulatory discards." The Act specifically excludes fish that are released alive under recreational catch-and-release programs.

Some Common Terms

Target catch. The catch of a species (for example, shrimp, cod, or bluefin tuna), a particular size or sex, or an assemblage of species (such as "reef fish") that is primarily sought in a fishery.

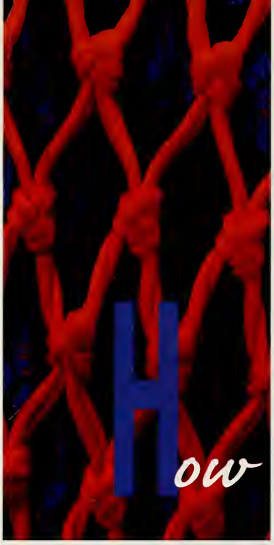
Incidental catch. The catch that was not targeted, as when a fisher catches croakers while trawling for shrimp.

Discarded catch. That portion of the catch returned to the sea or elsewhere as a result of economic, legal, or personal considerations. This includes regulatory discards (sizes, sex, and species that must be returned to the sea whether dead or alive at capture) and economic ("discretionary") discards, which are the target of a fishery, but are not retained because they are of an undesirable size, sex, or quality.

Prohibited species. A species for which retention is prohibited in a specific fishery. For example, Alaska king crab taken in groundfish trawls cannot be retained, while those caught in authorized crab pots can.

Protected species. Any species subject to special conservation and management measures, such as the Marine Mammal Protection Act, Endangered Species Act, or Migratory Bird Treaty Act.

Unobserved fishing mortality. Mortality of a marine species resulting from an encounter with fishing gear that does not result in the capture of that species by a fisherman. For example, fish frequently escape after being hooked, but may later die unnoticed.



How widespread is bycatch?

Bycatch problems are both global and national. An overview is found in the 1994 United Nations Food and Agriculture Organization (FAO) paper "A Global Assessment of Fisheries Bycatch and Discards."

World Bycatch

FAO conservatively estimates annual worldwide commercial fisheries discards at 27 million metric tons (mt), with about 77 million mt of catch landed. Thus, about one-quarter of the catch may be discarded. This does not include recreational and subsistence discards or discards in many mollusk fisheries, which would substantially increase the estimates.

The global bycatch of protected species is also substantial. The International Whaling Commission estimates that 65,000 to 80,000 marine mammals still perish as bycatch each year. Purse seine fisheries for yellowfin tuna in the Eastern Tropical Pacific (ETP) killed hundreds of thousands of dolphins annually until the 1990s, when such deaths decreased to less than 4,000 each year, due to industry efforts. FAO reports 40,000 sea turtles killed annually in global longline fisheries, and additional turtle

Stern trawlers are the backbone of the North Pacific groundfish fisheries.

Thousands of small shrimp boats trawl the northern Gulf of Mexico and South Atlantic.

deaths occur in other gear. Sea bird capture is another growing concern, especially for some albatross and petrel species in longline fisheries.

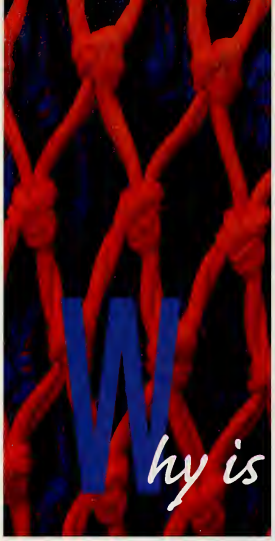
U.S. Bycatch

The highest U.S. ratios of discarded-to-retained catch are in Southeast shrimp trawl fisheries, although this bycatch is steadily declining. However, ratios do not adequately measure the impact on bycatch species: heavy shrimping bycatch of some fish species, such as red snapper, may seriously diminish these stocks, yet not be a problem for other species, such as spot. Conservation problems also occur elsewhere, such as New England, where yellowtail flounder are so severely depleted that their take as bycatch seriously impedes the stock's recovery.

North Pacific groundfish fisheries have America's largest volume of bycatch, although it is just a small percent of the huge harvest. They also face complex allocation problems when bycatch limits on "prohibited species catches" (crab, salmon, and halibut) are reached. The resulting closure of the target fishery sometimes means that groundfish quotas worth millions of dollars remain uncaught.

Recreational fishing, too, can result in heavy discarding. In the Southeast, for example, more than 50 percent of the recreational catch is released because of voluntary "catch-and-release" practices or as a result of bag or size limits. But little is known about the survival rates for many discarded recreational species.

Protected species bycatch is another serious national concern. The National Academy of Sciences estimates that in the 1980s, southeastern shrimp trawling may have resulted in up to 55,000 sea turtle drownings each year. The required use of turtle excluder devices (TEDs) has reduced this mortality significantly. Although ETP dolphin takes have been cut dramatically, harbor porpoise are still killed in Gulf of Maine gillnets, and beaked whales sometimes perish in Atlantic swordfish drift gillnets. However, it is important to remember that most fisheries do not take substantial numbers of protected species.



Why is bycatch such a controversial topic?

Bycatch raises conservation, economic, social and ethical concerns. Controversy is especially likely when one fishery inadvertently catches fish that constitute another group's livelihood. For example, young flounder killed as bycatch in the Northeast sea scallop fishery will never be available to the flounder fishery. Other economic concerns surface when vessel owners are required to purchase new, more selective gear in order to protect dolphins, sea turtles, and sea birds.

Survival rates, which vary widely among fisheries, are another subject of controversy for both discards and animals that manage to escape after capture. For instance, survival of groundfish in North Pacific fisheries is markedly different among trawls, pots, and longlines. Survival

Turtle excluder devices are required in most Southeast U.S. shrimp trawl nets.

also varies by vessel type, fishing area and time, size and condition of captured fish, and other factors.

Of course, not all animals that encounter fishing gear are killed or discarded. Some gear (such as pots and traps) and species (such as some crabs and lobsters) may allow for returning unwanted catch to the sea in good condition.

Utilization is another growing controversy. Some people want laws that require utilization of the entire catch or some defined portion of it. Others disagree, citing a lack of markets or very low prices for discards. Some groups are also concerned about ecosystem balance and the potential for polluting coastal areas with processing waste. Another fear is that requiring full utilization may sidestep the more important goal of avoiding bycatch in the first place; if not properly accounted for, such "utilized" bycatch could lead to overfishing.

Bycatch controversies can have sweeping consequences, as when consumers boycott products of fisheries deemed wasteful or anti-conservation. Such a "public ethic" was responsible for fishery regulations that ultimately drove most of the U.S. Pacific tuna fleet across the world to Guam and American Samoa. The bycatch spotlight can lead to real improvements in conservation, but may also lead to unpredictable effects. Banning a fishing practice in one area may merely shift fishing effort elsewhere, or replace one bycatch problem with a worse problem.

Modern fishing means new regulations and gear modification.

Common Concerns About Bycatch

The subject of bycatch can elicit very strong societal reactions. The National Fisheries Conservation Center, an industry focused group, has framed peoples' concerns in a helpful way:

Conservation. Does bycatch endanger stocks not intended to be taken, or does it contribute to overfishing by catching the target species at an age or sexual stage that should be allowed to grow and reproduce in order to rebuild the stock?

Utilization. Is the fishing industry using what it catches? Should it utilize all it catches?

Competition for the resource. Does one fishery's bycatch diminish the amount or value of species that can be taken in another fishery?

Ethics. Is it wrong to unavoidably kill or to harass certain creatures, such as dolphins, in the course of fishing activities, or to kill very large quantities of unwanted fish?

The Magnuson-Stevens Act reflects all these concerns and adds a new National Standard: "Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." The eight Regional Fishery Management Councils share with the Secretary of Commerce the responsibility for implementing this standard in all federal fishery management plans.

Why is reducing bycatch difficult?

There are many obstacles to effective bycatch control.

Knowledge gaps. Scientific information is often poor, especially on the magnitude of discards and unobserved mortality; animals' ability to escape fishing gear; economic and social impacts of bycatch; effects of regulations on target and nontarget species; and the ecological consequences of both discarding and full utilization.

Feasibility. Some proposed innovations and incentives may be too difficult or costly to implement. Market-driven measures, or those depending on individual accountability, may require changes in applicable statutes. And conflicting state and federal fishery regulations may impede bycatch reduction.

The Regional Fishery Management Councils work with industry to develop bycatch measures.

Failure to use selective gear. Many fishing operations are financially marginal and unable to invest in more selective gear or fishing practices. They may also simply be unaware of innovations in other countries or fisheries. Or gear experts may not be available to demonstrate or fine-tune new gear.

Interactions between fisheries. Measures to control a fishery's bycatch frequently have both anticipated and unanticipated effects on other fisheries. For example, vessels that have reached their bycatch "cap" often shift operations to other areas and target species, altering bycatch patterns there. Time or area closures, gear restrictions, and other measures can have similar impacts and sometimes, what solves one bycatch problem creates another, as when modifying tuna fishing practices to avoid catching dolphins results in increased bycatch of immature tunas and other species.

Even with selective fishing gear and practices, and progressive regulations, some level of bycatch is going to be unavoidable. This is especially true when the target and bycatch species are similar sizes, school together, and have similar responses to fishing gear.

Effective enforcement is one key to effective bycatch regulation.

The Dangers of Generalizations

Though trawl fisheries account for more bycatch than other gear types, bycatch also occurs with gillnets, longlines, purse seines, trolls, pots, dredges, sportfishing tackle, and all other gear. Generalizing about any one gear type is dangerous, however, because of great variability in gear conformation, fishing practices, geographic area, season, time of day, crew expertise, and other factors.

One of the most highly publicized bycatch controversies did not involve trawling at all, but concerned the high-seas driftnet fisheries for salmon and squid. FAO notes that bycatch rates and types differed dramatically among the few nations using this gear, with Japanese driftnets having a much greater bycatch of salmon, marine mammals, sea birds, and turtles than did the more numerous Korean and Taiwanese nets. But they were all perceived as jeopardizing the ocean ecosystem, and all use of these huge nets has now been banned by the United Nations.

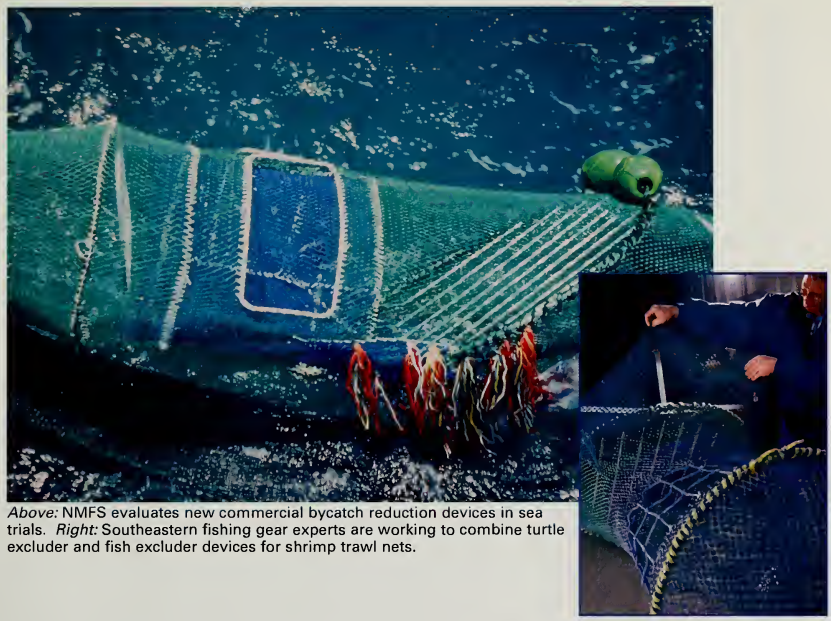
State and federal scientists onboard research vessels provide information on discarded catch.

What is NMFS doing to reduce bycatch?

In 1995, the Fisheries Service sponsored workshops for bycatch experts. The goal was to create a cooperative bycatch reduction planning network. The hundreds of participants from state and federal agencies, Native American tribes, the fishing industry, university Sea Grant programs, and nongovernment organizations agreed on the need to adopt several strategies:

- Involve all participating fishery interests.
- Identify specific regional and national needs and funding sources.
- Develop effective systems to coordinate, monitor, and evaluate bycatch reduction measures.

The NMFS science centers work with universities and industry on bycatch solutions.



Above: NMFS evaluates new commercial bycatch reduction devices in sea trials. *Right:* Southeastern fishing gear experts are working to combine turtle excluder and fish excluder devices for shrimp trawl nets.

- Implement market-based incentives, where appropriate.

- Ensure that controversial or complex issues involve a well-coordinated public education effort.

- Develop communications systems to share bycatch-related information, especially global solutions.

- Use skilled arbitrators to mediate conflicts and move competing stakeholders toward cooperative partnerships.

The Fisheries Service has already begun to implement these strategies. A team of its bycatch experts has developed a long-range strategic plan that summarizes knowledge about bycatch, identifies information needs, and offers options to coordinate agency and external research efforts. The agency's Marine Fisheries Advisory Committee (MAFAC) is helping to guide bycatch policy at the national level, and the Regional Fishery Management Councils are working with the Fisheries Service to implement the bycatch provisions of the new Magnuson-Stevens Act.

Special agency studies have explored market-based bycatch solutions, public education strategies, and planning alternatives. And since research is a key to reducing bycatch, the agency's Saltonstall-Kennedy and Marine Fisheries Initiative (MARFIN) programs, as well as other funds, are being used to develop:

- Effective bycatch-reduction devices and conservation-oriented fishing practices.

- Biological, economic, and sociological information for the fisheries and the fishing communities that depend on them.

- Bycatch management options.

- Technologies to utilize discards and reduce processing waste.

Bycatch Success Stories

Southwest

The world's best-known dolphin conservation program is in the Southwest, where the setting of purse seines around ETP tuna schooling with dolphin has ceased. As a result, canned tuna sold in this country is virtually "dolphin-safe," and the fishery's dolphin kills dropped dramatically by 1995.

Southeast

Government and industry have implemented a cooperative research program to reduce finfish bycatch in Gulf of Mexico and South Atlantic shrimp fisheries. The program has led to a real understanding of how shrimp trawls affect finfish stocks, and has resulted in very effective bycatch-reduction devices for these fisheries. The region also has a highly regarded technology transfer program for TEDs.

North Pacific

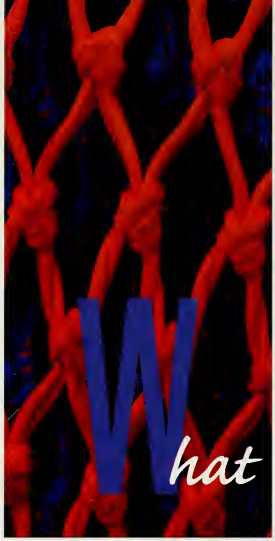
In the North Pacific, industry's desire to improve survival of halibut bycatch led to methods to safely and quickly release this species. Another industry innovation electronically transmits observer data from the groundfish fleet to a private contractor for "real-time" analysis, then transmits the information to the vessels so they can avoid crab, halibut, and salmon "hot spots."

Northeast

In the Northeast, the "Nordmore grate" finfish excluder device for shrimp nets has proven its worth to the industry by reducing costly shipboard sorting. In addition, scientists and harvesters are jointly testing the effectiveness of gillnet "pingers"—electronic devices that emit beeper-like sounds to warn harbor porpoises of the nets' proximity.

The fishing industry is playing a strong role in the development of gear to reduce bycatch.

Over the past two decades, dolphin deaths in the Eastern Tropical Pacific purse seine tuna fishery have decreased dramatically.



What does the future hold?

While effective conservation gear is a major element of reducing bycatch, American and foreign fisheries are also implementing many other measures to reduce bycatch.

Area and seasonal closures are common, the devastating use of explosives on reefs is being prohibited, and fishermen are being trained in new fishing practices. Industry and netmakers are working closely with governments to understand how the swimming behavior of bycatch species can be channeled to avoid capturing them. And where protected species are present, vessel crews are being taught to resuscitate and release captured sea turtles and other animals.

But it is important to remember, reflecting the Magnuson-Stevens Act goal of minimizing bycatch to the extent practicable, that there will always be some bycatch in fishing activities.

Perhaps most encouragingly, there is a growing global commitment to reducing bycatch. Cooperative industry-government efforts are increasing, permitting rapid integration of new products and timely information into fishing operations. The National Marine Fisheries Service and its parent organization, the National Oceanic and Atmospheric Administration, believe these partnerships are the key to improved bycatch management.

Your views are welcome

This brochure is only the first of several reports intended to communicate progress by industry and the government in reducing bycatch. The views and suggestions of everyone interested in reducing bycatch are welcome. Comments may be directed to any of the following:

NMFS Headquarters

1315 East-West Highway, Silver Spring, MD 20910
- Director, National Marine Fisheries Service
- Director, Office of Science and Technology
- Director, Office of Sustainable Fisheries
- Director, Office of Protected Resources

Regional Administrators

Northeast Region:	One Blackburn Drive, Gloucester, MA 10930
Southeast Region:	9721 Executive Center Drive, N., St. Petersburg, FL 33702
Southwest Region:	501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802
Northwest Region:	7600 Sand Point Way, N.E., Bin C15700, Building 1, Seattle, WA 98115
Alaska Region:	P.O. Box 21668, Juneau, AK 99802

To read more about bycatch

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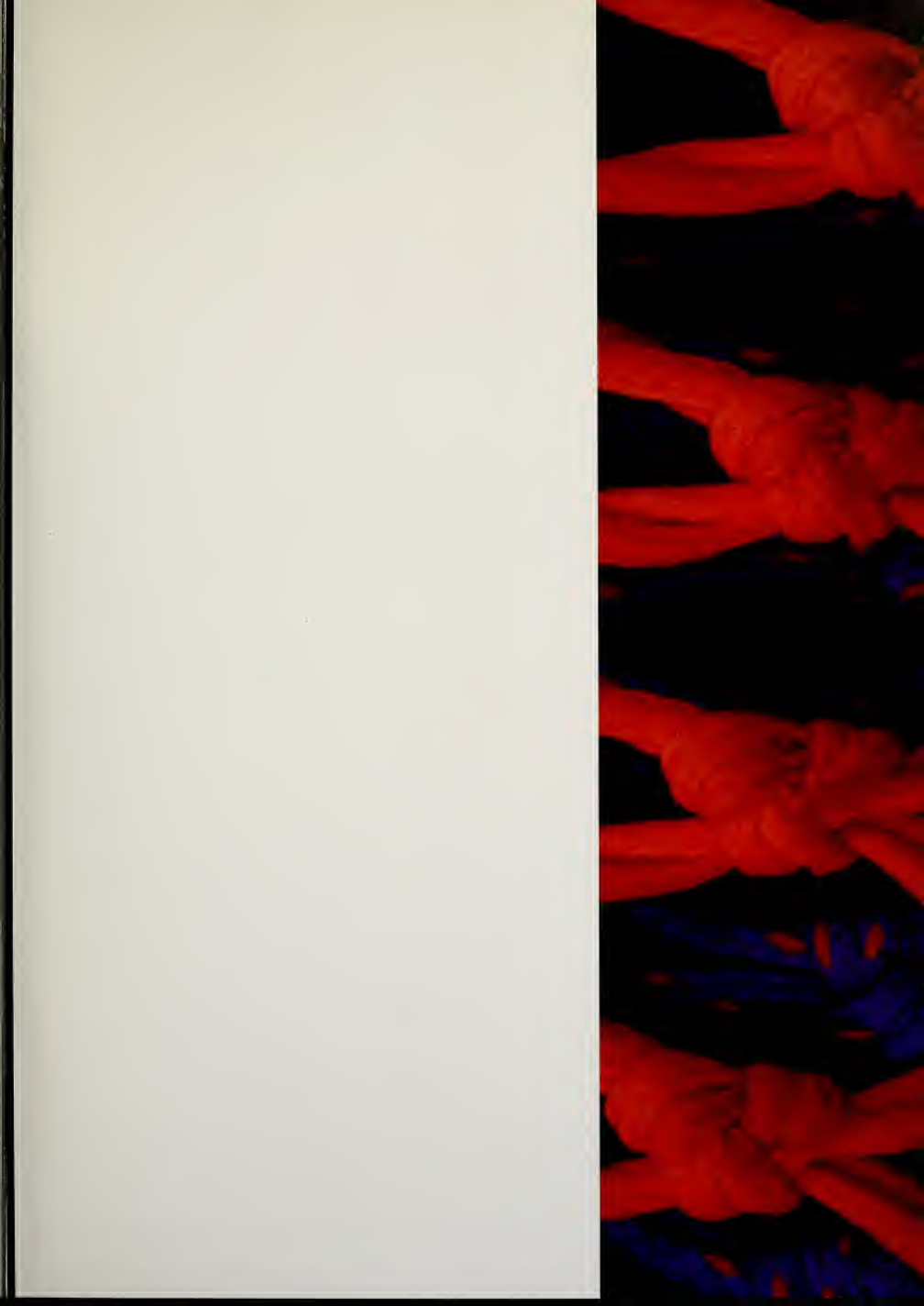

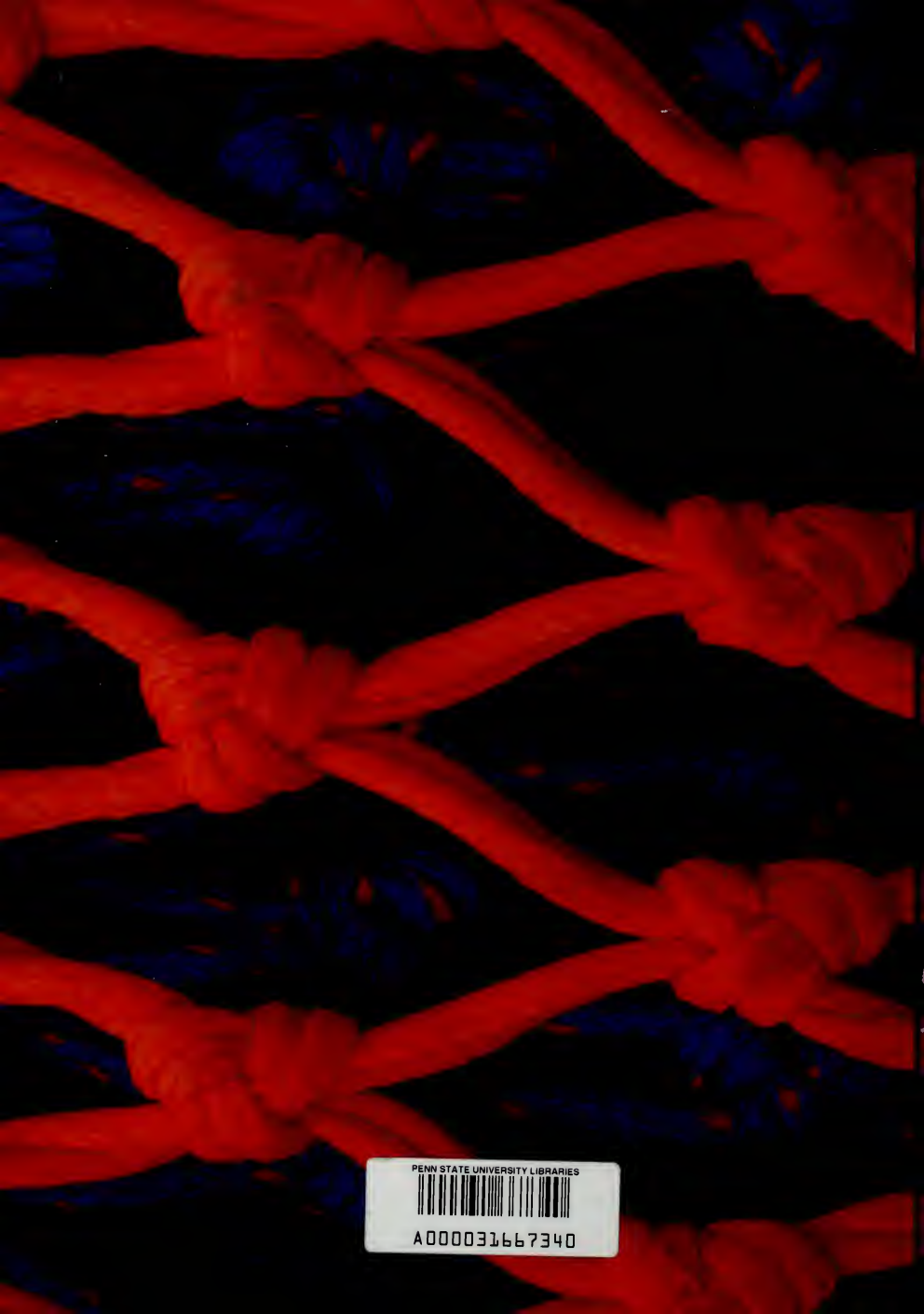
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